THE IMMATURE STAGES OF *EUPLEXIA IORRHOA* (MEYRICK) (LEPIDOPTERA: NOCTUIDAE)

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Abstract

The immature stages of *Euplexia iorrhoa* are described and notes given on the distribution of this species.

Introduction

Euplexia iorrhoa (Meyrick) is known only from Tasmania. Nothing has been recorded of its biology or immature stages. Artificial rearing of larvae and consideration of light trapping collections have provided an insight into the biology and distribution of this species.

Methods

Three light-trapped females were placed in glass oviposition jars with stretched muslin covers, folded paper towel and a 2% sugar solution. Eggs were removed to moist filter paper in petri dishes after surface sterilizing. Larvae were reared on a modified Shorey's medium in waxed paper cups and pupae removed from the cups and placed in folded paper towel in glass jars with loosely attached lids. Pupae were moistened every few days and adults of normal appearance and size were obtained.

Photoperiods during rearing (February-July) comprised natural light plus an irregular amount of artificial light for a few hours on many nights. Temperatures during egg incubation were 18-21°C and during larval growth were 16-20°C. Rearing took place in a laboratory near sea level in Hobart and optional room heating was used to provide temperatures considerably warmer (10-16°C greater) than at the site of capture of the females, viz. nearby Mt Wellington, 1000 m. A fourth female was captured after the main study was completed and larvae reared from it using both media and various low garden plants as food. This female and its progeny were kept under a wider temperature range.

The chorion of ethanol preserved eggs was examined in lactophenol slide preparations of chorion fragments at x400. Measurements of ethanol preserved eggs were made using a dissecting microscope and scaled eyepiece and all drawings were prepared using a grid eyepiece.

The terminology of egg structure follows that of Salkeld (1975) but the term ribs rather than reticulation is used here to indicate solid, well defined struts lying on the chorion and often surmounting the broad vertical chorion ridges found in many noctuid eggs.

Material examined:– Eggs from three females and larvae and pupae from two of these. Females collected at Chalet, Mt Wellington, 1000 m, 1.ii.1979, L. Hill. Numbers 8 and 9 in Tasmanian Agriculture Dept. Entomology

Branch Collection and number 10 in Australian National Insect Collection (labels include author's numbers).

Egg

Description: Table 1 gives details of size and vertical ridge number. Dome-shaped; cream when fresh, developing orangish brown equatorial band and dorsal pole after 2-3 days; alternate vertical ridges extending from outer margins of tertiary cells to circumference of smooth, flat base but remainder not extending so far dorsally; series of horizontal ridges linking vertical ridges, their junctions with latter alternating along either side of each vertical ridge; vertical ridges 6-8 μm wide; horizontal ridges narrower; both types of ridge devoid of surmounting longitudinal ribs; aeropyle openings 5 μm diameter, on vertical ridges at junctions with horizontal ridges, extending full length of vertical ridges; chorion of secondary, tertiary and columnar cells pitted (in slide preparations) with numerous holes *ca* 1.0 μm diameter; chorion of ridges and primary cells not pitted; micropylar rosette 80 μm diameter, with *ca* 15 cells; secondary and tertiary cells below level of primary cells and dorsal ends of vertical ridges i.e. micropylar rosette appearing raised.

TABLE 1
Egg size and vertical ridge number of *E. iorrhoa*; samples drawn from three females, s.d. are means of three subsamples standard deviations

	Mean	s.d.	Range	n
Height (mm)	0.53	0.03	0.49-0.57	25
Diameter (mm)	0.81	0.02	0.77-0.85	25
Vertical ridges	21.2	0.68	18-23	38

Comments:– The four females laid 142, 152, 145 and 439 eggs and survived in captivity 11, 19, 5 and 9 days respectively. Eggs from the female surviving 19 days failed to develop. Eggs were oviposited singly and occasionally in pairs and triplets, cemented by the base in approximately equal numbers to the glass, muslin and paper towel surfaces. The incubation period was 5-10 days.

In slide preparations the columnar cell chorions of *Neumichtis sepultrix* (*Guenée*) and *Syntheta nigerrima* (Guenée) also appear pitted by numerous holes *ca* 1.0 μm diameter. Scanning electron microscopy at x400 of the eggs of these two species has shown the columnar cell chorion surfaces to have irregular anastomosing struts forming cavities (Hill, unpub. thesis). The vertical ridges of these two species are also devoid of surmounting longitudinal ribs. In contrast, the columnar cell chorions of *Rictonis* Nye and *Praxis* Guenée appear solid or very finely pitted in slide preparations and nearly smooth in scanning electron micrographs taken at x1000. The vertical ridges of these two genera are surmounted by longitudinal ribs 1.5-6.0 μm wide and three to four times higher than wide.

Larva
(Figs 1-5, 8-11)

Description:– Table 2 gives details of head capsule dimensions.

First instar 1.75-3.50 mm (n = 8); green without distinct markings; setae black, 0.2 mm long, on large brown plates *ca* 0.06 mm wide; prolegs short on abdominal segments 3 and 4.

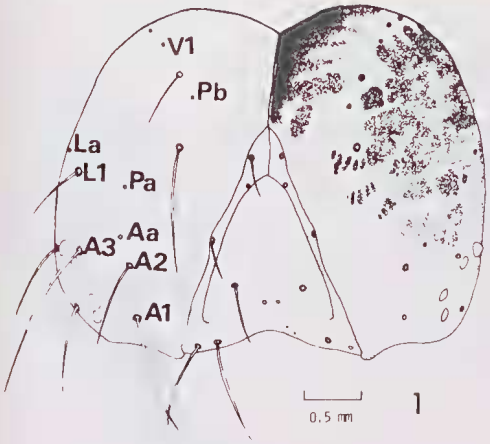
Second instar *ca* 2.5 mm (n = 1); green with white middorsal and supraspiracular longitudinal stripes, setae without white circle at bases, head markings similar to later instars, some larvae with patches of black and reddish brown pigments; setae not on plates.

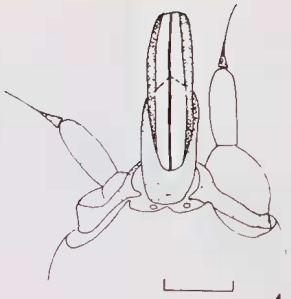
Third instar 7-13 mm (n = 3); fourth *ca* 9 mm (n = 1); fifth 12.5-21.0 mm (n = 5); sixth 19-35 mm (n = 6); markings of third to sixth instars similar to seventh.

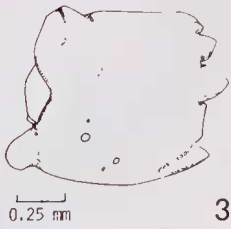
Seventh instar 30-50 mm (n = 8); with pale and dark forms (Figs 8-11), both countershaded, both greyish pink in ventral half, darker greyish pink or blackish pink in dorsal half, dark forms possessing patches of black and reddish brown pigments; conspicuous protruding orange and white circles 0.75 mm diameter at bases of D2 setae on abdominal segment 8; conspicuous series of black circles 0.70 mm diameter at bases of abdominal SD1 setae, merging into black supraspiracular band in dark forms; orange and white supraspiracular stripe limited to thoracic and anal segments; faint pale areas extending posterodorsally from SD1 setae; abdominal D1 setae in white circles 0.28 mm diameter; abdominal D2 setae in orange circles 0.38 mm diameter; abdominal L1, L2, L3 and MD1 setae in white circles 0.20 mm diameter; L1 and MD1 circles without black margins, other circles with black margins; prolegs equal, crochet formula 30: 31: 32: 33: 38, ranges 28-32: 28-33: 30-35: 31-36: 36-45 (n = 14); cuticle appearing smooth at x80. Thoracic D1 and D2 setae in white and orange circles 0.35 mm diameter with black margins; thoracic L1, L2 and L3 setae in white circles without black margins; prothoracic shield (Fig. 5) similar in colour to general dorsal surface but with five white patches across anterior margin. Head (Figs 1, 2) medium brown dorsally, pale along line of V and P setae, light brown laterally with pale areas posterior to stemmata, pale ventrally and anteriorly, black around

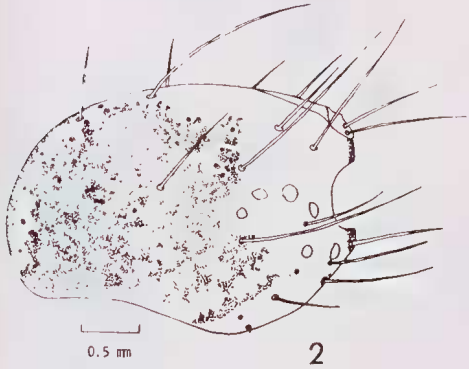
TABLE 2
E. iorrhoa head capsule dimensions; F/Ep = length of frons / length of epicranial stem

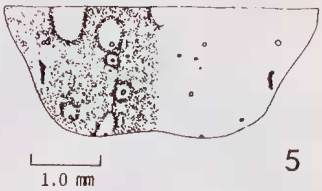
Instar	Width (mm) mean and range	Dyars value	F/Ep mean and range	n
1	0.42 (0.41-0.43)	–	1.33 (1.11-1.64)	8
2	0.60 (0.55-0.63)	1.43	1.21 (1.07-1.42)	7
3	0.93 (0.85-1.12)	1.55	1.08 (1.00-1.20)	17
4	1.40 (1.27-1.50)	1.51	0.99 (0.91-1.09)	14
5	1.96 (1.82-2.14)	1.40	0.90 (0.80-1.09)	16
6	2.65 (2.52-2.87)	1.35	0.81 (0.72-0.91)	9
7	3.77 (3.50-4.10)	1.42	0.81 (0.73-0.94)	14

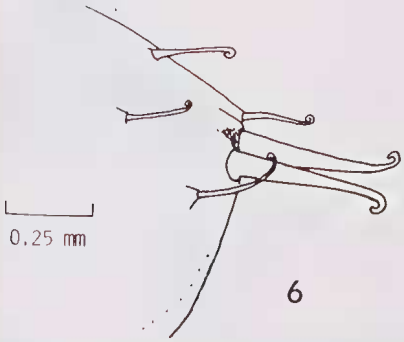


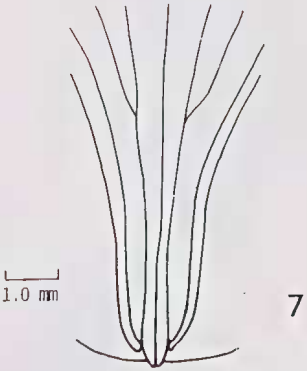












Figs 1-7. *E. iorrhoa,* last instar larva. (1) head capsule; (2) same, right lateral; (3) right mandible, lateral; (4) spinneret and labial palpi, ventral; (5) prothoracic shield; (6) cremaster spines, left lateral; (7) pupal appendages.

bases of setae, stemmata in arc of white pigment broken between stemmata 4 and 5; mandibles (Fig. 3) with medial subapical tooth on ventral ridge. spinneret subequal in length to palpi (Fig. 4) (slightly longer than palpi in earlier instars). Spiracles brown with black rims.

Comments:– The seventh instar larvae were large compared with ultimate instar larvae of 17 other noctuid species reared concurrently. Larval duration. from hatching to pupa formation, was 53-81 days (mean 67 days) and comparable with those of several major and minor multivoltine pest Noctuidae reared concurrently e.g. *Persectania ewingii* (Westwood) 45-55 days (mean 50 days). Larval durations of the progeny kept at wider temperature ranges and fed plants in addition to media were within the preceding range. The prepupal period lasted only a few days.

Pupa

(Figs 6, 7)

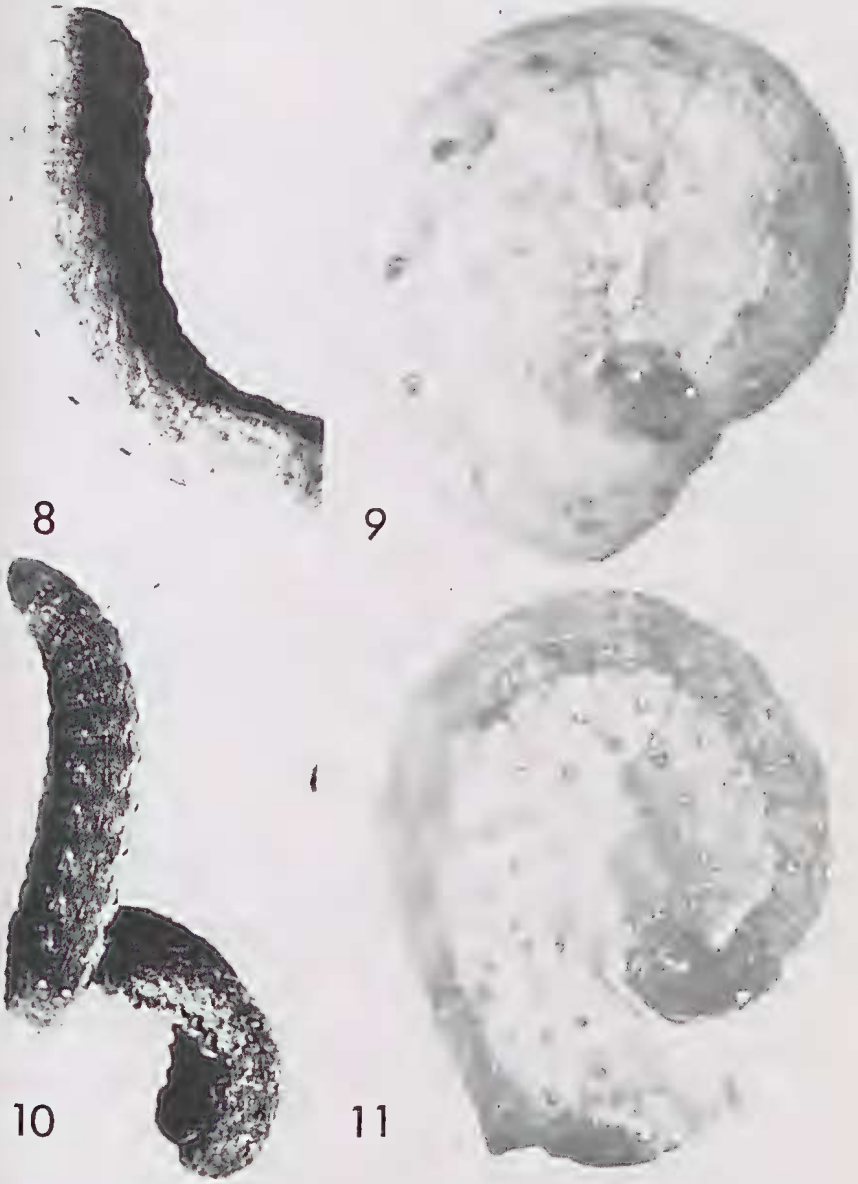
Description:– Dark brown, *ca* 220 mm long, with a row of punctation around the anterior margins of abdominal segments 5-7 and to a lesser extent on 4.

Comments:– The pupal duration was 51-83 days (mean 63 days) and longer than those of all the other species reared concurrently (including univoltine species) except for one montane early winter flying species in or near *Euplexia*. Pupal durations of the progeny kept at wider temperature ranges fell within the range given above.

Discussion

Adults of *E. iorrhoa* occur between December and March and are restricted to montane and higher country. Turner (1925, 1938) recorded *E. iorrhoa* adults from 420 m and 700 m on Mt Wellington near Hobart, from over 1000 m near Mt Field and at 1000 m near Cradle Mt. Adults have recently been collected at 720 m, 870 m and 1000 m on Mt Wellington being more common at the higher two sites. They have also been collected at 440 m on Red Knoll at the southern end of Lake Pedder in south-western Tasmania. The vegetation at these sites includes exposed montane heath, montane wet sclerophyll forest and subapline woodland. At 870 m on Mt Wellington adults were especially numerous (mainly males) on 6 December at a mercury vapour light and represented a peak in adult activity.

The relatively short larval duration (67 days) but long pupal duration (63 days) found in the artificial rearing probably reflect adaptations to the short warm season of a high country habitat. A pupa, found in montane wet sclerophyll forest leaf litter at 400 m on Mt Wellington on January 28. emerged in nearby sea level Hobart on February 16. The minimum egg to adult duration in the laboratory was 3.6 months and the maximum was 5.6 months. *E. iorrhoa* is capable of rapid egg and larval development given warm conditions but appears unable to greatly foreshorten the pupal duration. Other Tasmanian univoltine Noctuidae reared concurrently with *E. iorrhoa*, viz. *Peripyra sanguinipuncta* (Guenée) and *Rictonis* spp. had shorter pupal



Figs 8-11. *E. iorrhoa,* last instar larva. (8, 9) pale form; (10, 11) dark form.

durations (1 month) but long larval durations (3-5 months) in the laboratory. Several multivoltine pest species had short larval (1-2 months) and pupal (2-3 weeks) durations in concurrent rearing. These latter species are *P. ewingii*, *N. sepultrix*, *S. nigerrima*, *Diarsia intermixta* (Guenée) and *Agrotis porphyricollis* Guenée.

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ESTABLISHMENT OF THE LESSER WANDERER, *DANAUS CHRYSIPPUS PETILIA* (STOLL) (LEPIDOPTERA: NYMPHALIDAE) ON NORFOLK ISLAND

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On 22nd March, 1980 I noticed a specimen of *Danaus chrysippus petilia* (Stoll) (Lesser Wanderer) visiting flowers of gerberas in my garden in New Cascade Road, Norfolk Island. The identification was subsequently confirmed by the Australian Museum. Three further specimens were seen later on the same day.

On 23rd March, mating and egg laying (on Cotton Bush, *Gomphocarpus*) were observed. By the end of March four specimens had been collected and many seen in flight.

The period 22nd to 24th April, 1980 was spent on Philip Island (about 6.5 km south of Norfolk Island). On this occasion adults and larvae were seen. One adult was observed drinking from salt water.

Danaus chrysippus has not previously been recorded from Norfolk or Philip Islands but it is now clearly established as a breeding species. As observations on the butterflies of Norfolk Island have been continuous for some years there is little doubt that the species has been detected soon after its arrival and that establishment is very recent.